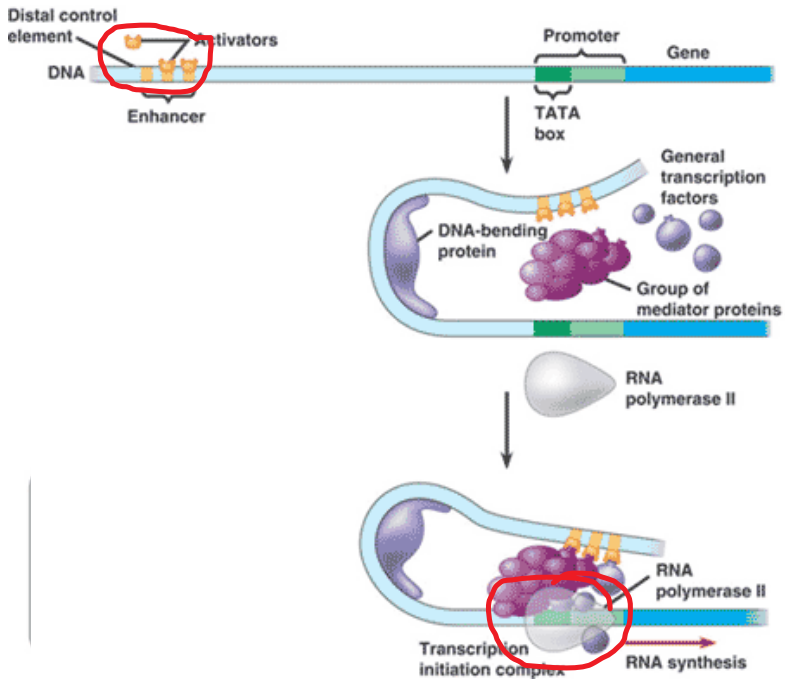
Notes Questions for the Unit 13, Part 1 Notes: Development of Organisms

Ms. Ottolini, AP Biology

1. Identify the role of the activator proteins in eukaryotic gene expression (see picture below).

   Activator molecules binding to the enhancer region on the DNA, allows the DNA to form a loop-like structure which enables RNA polymerase to bind to the promoter region on the DNA and begin transcribing the genes

   Activator molecules help turn genes on



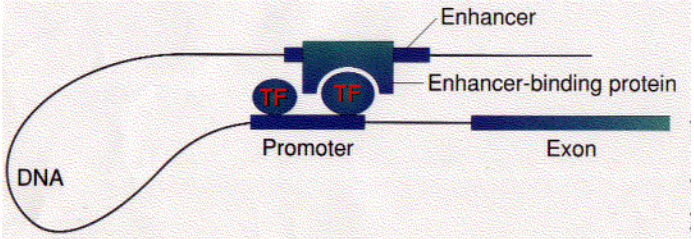
2. Explain the role of apoptosis in development and describe HOW apoptosis occurs within a cell.

Role of Apoptosis: When the embryo is going through morphogenesis (sculpting the body shape), programmed cell death (apoptosis) helps define body borders and openings (ex: mouth)

How: Enzymes in the cell going through apoptosis break the molecules in the cell into tiny pieces, which are digested by other cells in the body called “macrophages”

3. Let's say the exon pictured in the eukaryotic DNA sequence in the image below codes for the production of the muscle protein myosin. Describe how it is possible for this gene to be turned on in muscle cells but not other cell types.

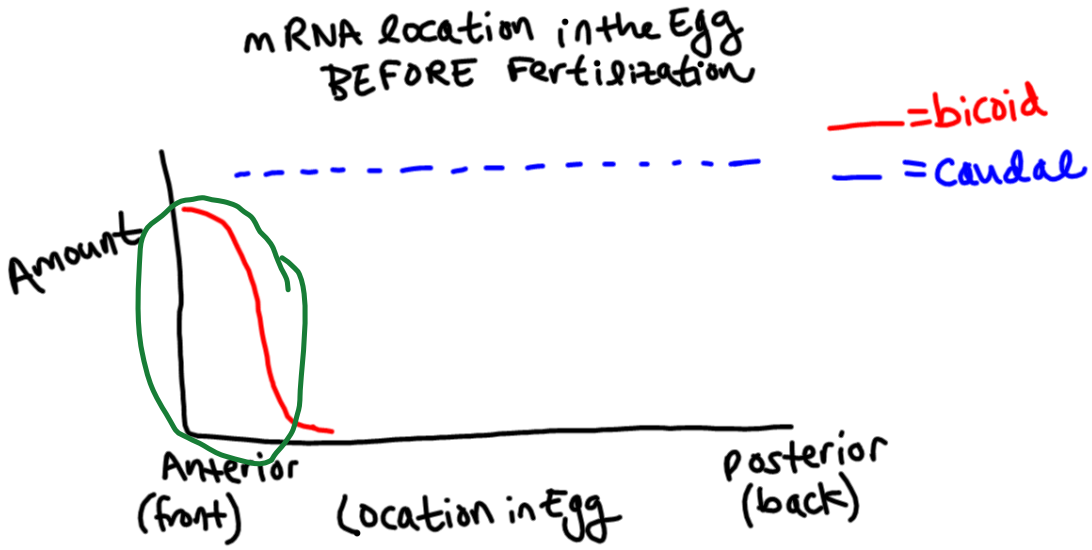
   Remember: Another name for the "enhancer-binding protein" is the ACTIVATOR.

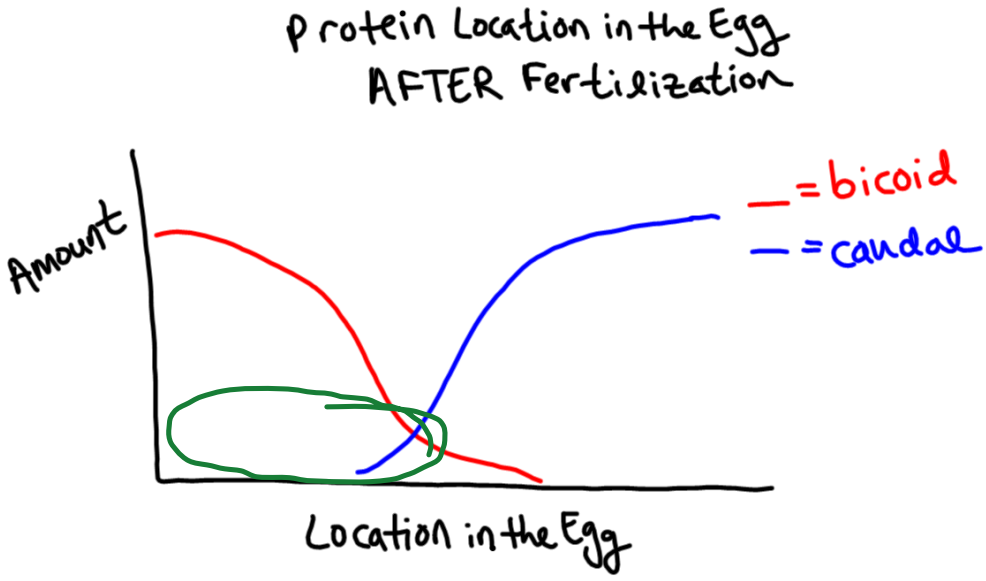


Activators and transcription factors shown in the image are only present in cells that need to make myosin (ex: muscle cells)… these activators and transcription factors cause the formation of the DNA loop, which enables RNA polymerase to bind to the promoter and transcribe the exon

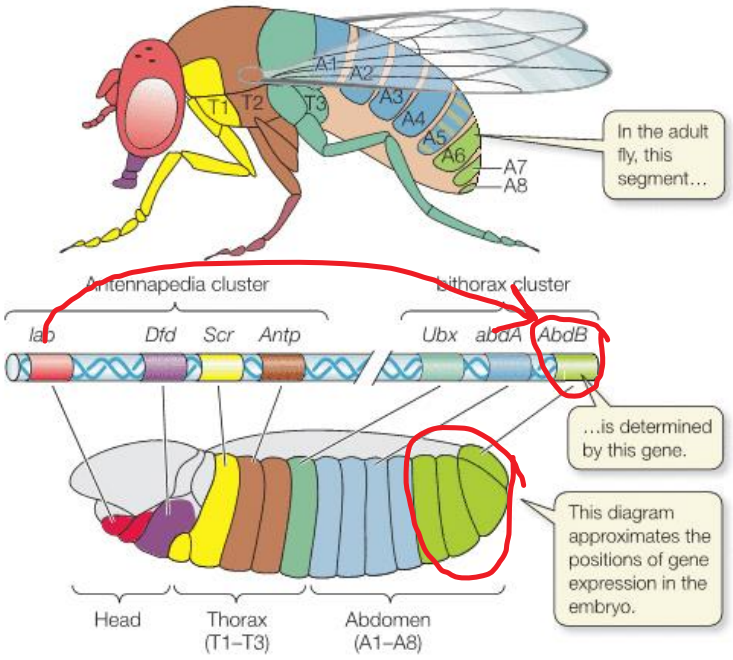
4. How does the presence of bicoid mRNA in the anterior (head) region of a fly embryo affect the translation of caudal mRNA to make caudal protein in this region (see picture to the right)?

We see high levels of bicoid mRNA in the anterior region but low levels of caudal protein… so bicoid mRNA must prevent the translation of caudal mRNA (which IS high in the anterior region) to make caudal protein





5. The diagram below shows homeotic genes that govern body development in fruit flies (*Drosophila melanogaster*). Locations governed by certain genes are shown in an adult (below top) and an embryo (below bottom).



Suppose a fly possesses a homeotic mutation in which the "AbdB" gene was replaced by the "lab" gene. How will this change the appearance of the adult fly?

The adult fly will have a "butt head." The lab gene codes for the creation of the head region, whereas the AbdB gene codes for the creation of the butt region. If lab replaces AbdB, we will have a head region forming where the butt should be.